



MAGAZINE

PRICE TWOPENCE

SEPTEMBER 1957



THE I.C.I. MAGAZINE

VOLUME 35 NUMBER 251 SEPTEMBER 1957

The *I.C.I. Magazine* is published for the interest of all who work in I.C.I., and its contents are contributed largely by people in I.C.I. It is edited by Sir Richard Keane, Bt., and printed at The Kynoch Press, Birmingham, and is published every month by Imperial Chemical Industries Limited, Imperial Chemical House, Millbank, London, S.W.1. Phone: VICTORIA 4444. The editor is glad to consider articles for publication, and payment will be made for those accepted.

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FRONT COVER by Peter Smith
(General Chemicals Division)

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India and Ourselves

Contributed by India Department in collaboration with I.C.I. (India)

India's ambitious plans for industrial independence need foreign investment, and Britain has supplied more in the last ten years than any other country. I.C.I.'s manufacturing projects in what is still the Company's largest export market include explosives, dyestuffs and polythene plants.

IT is appropriate in 1957 to look at India and the part which I.C.I. is playing in its trade and development, for ten years ago, in August 1947, India became independent of British rule.

What kind of a country is India? It is indeed a sub-continent. In size it is substantially bigger than the whole of Europe west of the Iron Curtain. It is the home of many races and has as many languages. Its landscapes range from ice-clad mountains to palm-fringed tropical beaches. Its climates vary from the one extreme of the Assam Hills with a rainfall of over 400 inches to the arid desert wastes of Rajasthan, and from the 120° F. summers in the plains to the bitter frosts of the Tibetan frontier. It is indeed a land of infinite variety and many complexities, and yet a country united under democratic rule.

The problems of the British administration were to establish law and order, and to safeguard the vast and almost wholly rural population from the constantly recurring

danger of famine which arose from the vagaries of the monsoon, the summer rains on which India's cultivation mostly depends. To this end they established a Civil Service administration which was the envy of the world, introduced legal and public health

systems, and developed communications and irrigation works on a scale without parallel.

Thus India started in 1947 on its independent career with the incalculable advantages of a devoted body of public servants (for the British had wisely trained Indians of the highest ability to succeed them), of first-class ports and the cities which had grown up round them, and a network of railways and roads throughout the country. But the British rulers had never succeeded in raising significantly the standard of living of the Indian masses.

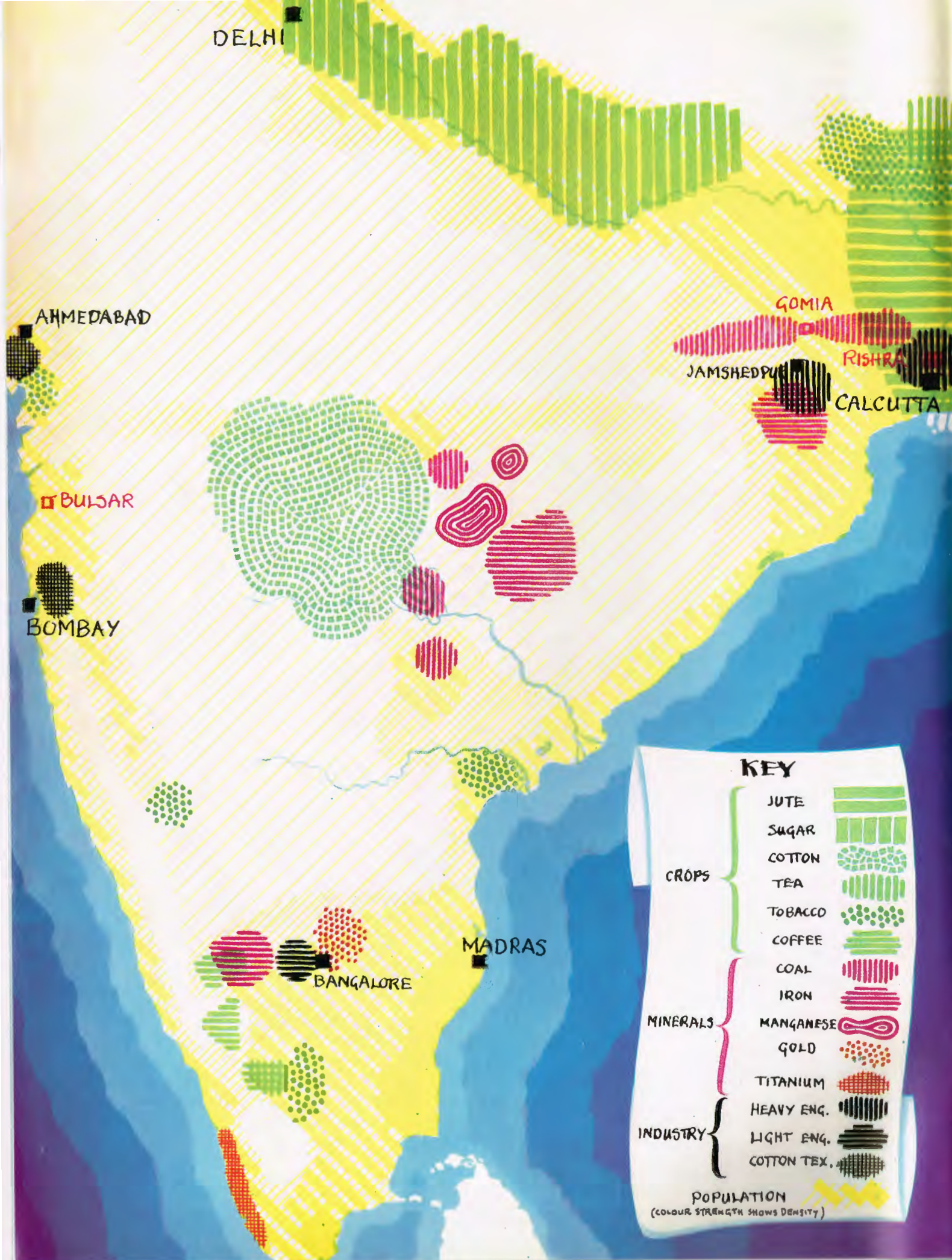
In 1857 the population of India (excluding that part which is now Pakistan) was 140 million; in 1947 it was 350 million. The way of life in the villages had scarcely changed in 100 or even in 1000 years. Their standard was, and is, as low as almost any in the world.

Once India was given its freedom a new spirit of enthusiasm and determination surged through the country. Under the dynamic leadership of Pandit Nehru they soon set about the task of raising their standards. They looked with envy at the astonishing



Site preparations at Gomia for Indian Explosives Ltd. Here traditional methods of excavation are used for a plant which will be one of the most modern of its kind.

Photographs by B. R. Goodfellow

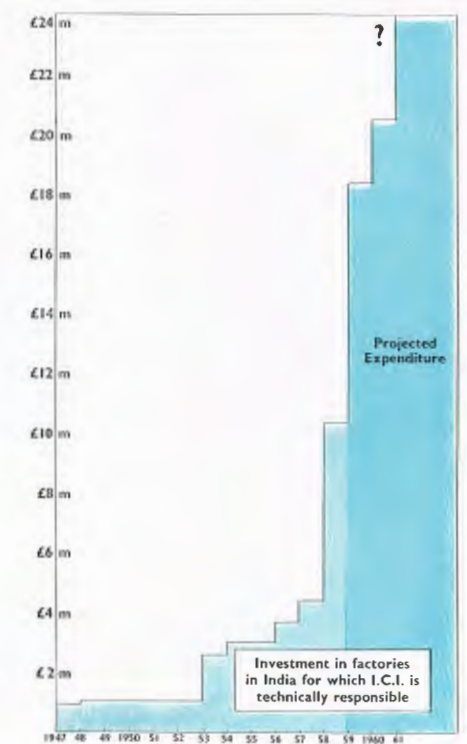
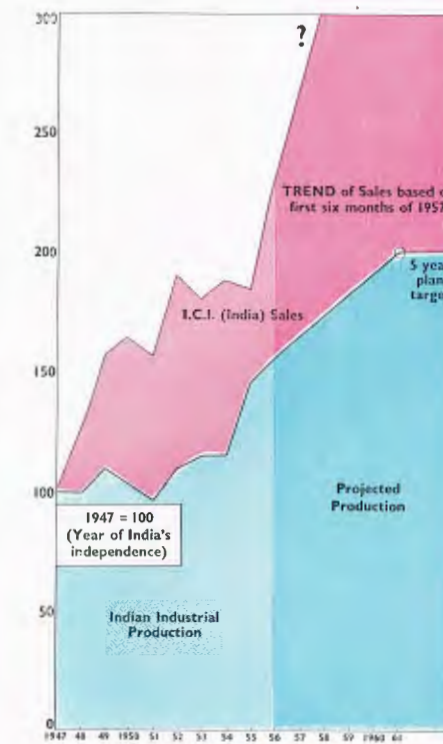


prosperity of the West; they looked too at Soviet Russia, which in thirty years had pulled itself up from a level not very different from their own to that of a leading world power. They saw clearly that first it was essential to safeguard food supplies and second that industrialisation was the key to the higher standards of the West.

In their determination to achieve prosperity they embarked upon two five-year plans. The first, now completed, gave priority to food problems by a large expansion of water conservation and irrigation works, by introducing improved methods of cultivation, and by completing important fertilizer plants. This was at once succeeded by the second plan. This is now in its second year and aims to establish heavy industries on which a manufacturing economy can be broadly and securely built. The State is tackling those industries basic to the economy of the country, such as the three new million-ton steel works, more fertilizer plants, and further development of railways; private enterprise is being encouraged to undertake a wide variety of other industries co-ordinated under careful Government planning direction.

This ambitious plan, which involves an expenditure of nearly £5000 million, is naturally imposing a heavy burden on the Indian economy. Large sums are needed in foreign exchange for equipment which India cannot yet produce herself, and she can do little yet to earn more foreign currency from her exports. She must depend in fact to a large degree on foreign aid in the form of investments from overseas and loans.

At the same time India has to make available large sums in rupees to pay for her expenditure in Indian labour and materials, for the teeming crowds of workers who by manual effort clear the factory sites, build the earthworks for the dams and prepare for the arrival of modern equipment from overseas. In order



to find these rupees it has been necessary for the Government to impose drastic restrictions on spending power within India, by severe taxation and by restricting the import of anything of a luxury character.

In consequence India is in a serious dilemma, for these very restrictions disturb the foreign investors whom India is endeavouring to attract, and tend to make them look elsewhere overseas for their developments. However, in Britain particularly, we believe that we understand and sympathise with India's present difficulties and have faith in her capacity to forge ahead after these difficulties have been overcome. Thus, although the rate of investment by foreign firms in recent years has been something of a disappointment to the Indian Government, it is not without significance that of all the money invested in India from overseas since independence by far the greatest part has been British. In this Britain has been sustaining her traditional role of India's closest friend and helper and fulfilling her responsibilities as the senior partner in the British Commonwealth of Nations.

I.C.I. is, of course, involved most closely in these problems. We have been trading for more than fifty years in India, which has for some time been the country to which I.C.I. exports are the largest.

We started by selling the simpler chemicals: soda ash for improving the washing of the universal cotton garments; caustic soda for soap-making; and bleaching powder for textile makers. Later we sold fertilizers from Billingham, especially to the estates where most of the tea we drink in England is grown.

Now the pattern is changing. The Germans, owing to the war, have lost much of their dominating position in dyestuffs, and Indian taste in colours is becoming more sophisticated; I.C.I.'s business in high-class dyestuffs is large and valuable. Plastics are satisfying a large and growing demand. Our double-edged attack on malaria has brought us valuable business in 'Paludrine' and 'Gammexane'—though this is showing signs of exhausting itself, as malaria is gradually being eliminated.

Development stimulates Imports

It is a well-known fact that a country which develops its industries creates a demand for more and not for less imports. Better-paid industrial workers require goods on which to spend their money, and the new industries themselves require a mass of minor materials, of which many must be imported. Thus I.C.I., as a supplier of a wide range of commodities, can scarcely fail to benefit in its trade with India from India's industrial growth; it is no coincidence that the sharp increase in I.C.I. (India)'s turnover since 1955 corresponds with the building up of industrialisation.

In India, as elsewhere, we in I.C.I. like to see our export trade maintained as long as possible, for a high level of exports is essential to the British economy and exports help to maintain our British factories at full load and full efficiency; but when there are sound economic grounds for establishing industries in India we are not content to see others develop exclusively those which are our concern.

Indian Participation

Thus, we started before the war with a small chlorine plant at Rishra, Calcutta; this has been consistently successful, and is now expanded to three times its original size, and includes secondary products such as 'Gammexane.' We built a paints factory on the same site soon after the war; this has been doubled, and its future is full of promise. It has been I.C.I.'s practice in India as elsewhere to offer nationals of the country a place in our manufacturing enterprises. There is a substantial Indian shareholding in the



India's abundant
Here ilmenite sand, a



man-power is often used for jobs which it would be uneconomic to do by hand in Britain.
raw material for titanium, is being carried to a beach on the Malabar coast for shipment overseas.

Alkali and Chemical Corporation of India, which operates the various plants at Rishra.

These, however, are relatively minor undertakings when set against the massive developments of heavy industry which are taking place. Unfortunately, the opportunities for I.C.I. in the heavy chemical industry are limited. Fertilizer manufacture is reserved in the "public sector" for development by the State, though I.C.I. contributed important advice and know-how in the planning and starting up of the first major State fertilizer plant at Sindri. Alkali is handicapped by ill-distributed raw materials and requires very costly plant. There remain those industries which have natural advantages or to which I.C.I. can contribute special knowledge.

Of these our first major enterprise since the war has been blasting explosives. The demand, for mining and for the big new public works schemes, is enough to support an economic unit, and the main raw materials are all available in India. We reached agreement in 1953 to erect a plant in partnership with the Government. This plant, which is at Gomia in Bihar State—one of the most attractive parts of India—is now nearing completion. We are also planning to put up a safety fuse plant there.

Our next major enterprise has been dyestuffs. India is by far the largest overseas colour market, and I.C.I. has given many years of careful thought to the problems of becoming established in this intricate and complicated industry. In this case we started by

going into partnership with an existing Indian manufacturer, Atul Products Ltd., who had developed a first-class site at Bulsar, north of Bombay. We set up a joint company in 1954 to manufacture jade green dyestuffs. This plant is now operating successfully, and a second and larger plant is being erected there to manufacture a wider range of vat dyestuffs. We have had many discussions with our partners on the possibility of extending these joint activities.

Our third major development is polythene. I.C.I. (India) has not been slow to follow the lead of U.S.A. and Europe in developing uses for polythene, and the market in this phenomenally successful I.C.I. product is growing fast. India has abundant and cheap supplies of alcohol—a by-product of their large sugar

(Continued on page 313)

'Visqueen' Operator

LAST year they produced enough polythene film at the British Visqueen factory at Stevenage to make a path from the world to the moon.

The factory, a venture backed jointly by I.C.I. and the Visking Corporation of America, started up in 1954 with a payroll of twenty. Now it has 200 employees. One of these is 30-year-old Albert Latham, a 'Visqueen' extruder operator.

Albert has been working at Stevenage for two years. Before that he was with a printing firm in London. It seemed quite a long jump from printing to plastics.

"Why the change?" I asked.

"The chance of a new house of our own in a new town," he replied. "In London all we could get when we were married was a couple of furnished rooms."

Now Albert has been joined at British Visqueen by his brother-in-law and his brothers, all of them ex-Londoners tempted out to Stevenage by the chance of new houses and new jobs.

The day I met Albert he was in charge of No. 8 extruder. The machine is one of the largest in the factory, and like British Visqueen itself is part British and part American. It stands 20 ft. high and can produce film as fine as one-thousandth of an inch thick and up to 54 in. wide. Some of the machines produce even greater widths. The latest achievement has been to make a 'Visqueen' sheet no less than 15 ft. wide. This is being used underneath the new concrete runways and roads under construction at Gatwick Airport, now being developed as a bad-weather alternative to London Airport.

Polythene melts at about 115° C., and it takes a long time for these large units to get thoroughly heated up to the right temperature. In the extruder, polythene chips (from Wilton) are heated to a treacly state and then forced out through a die, when the polythene is blown up under air pressure into a shimmering 15-foot-high giant balloon. The air bubble inside the balloon both keeps it inflated

until the polythene film is thoroughly hardened and also controls the width and thickness of the film. The balloon is then flattened between rollers and finally wound on to reels. The extruder's job on a normal shift is to keep the balloon on the move under accurately controlled conditions of temperature and air pressure. These need to be constantly checked in order to provide film of uniform width and thickness.

The bubble drawing method of polythene film manufacture was pioneered up at Winnington just before the war. Polythene developments in wartime Britain, however, centred essentially on its use for the armed forces, and the limited production was used for the insulation of high-frequency cables and in radar. In the United States, on the other hand, chemical firms licensed under our patents were able to make polythene freely, and since they were less handicapped than we in Britain they were able to make great strides in film manufacture for the packaging industry; some of them used the bubble process. Now the full circle has come around with British Visqueen extruding polythene film on this side of the Atlantic, using a development of the method introduced by the Alkali Division to the Americans as far back as 1940.

Film production at Stevenage is now double what it was this time last year, and it is still going up by leaps and bounds. Albert said he had given up trying to keep count of the exact number of extruding machines in the factory, and from the construction work going on all around I judged there would be plenty more in the next twelve months.

Apart from such eye-catching examples as the helicopter wrapped in 'Visqueen' film which was shipped out to the Transantarctic Expedition, 'Visqueen' is rapidly penetrating every corner of our everyday lives. Soon, I was told, I would even be buying my nylons wrapped in 'Visqueen,' and if I could afford a new TV set, that would probably reach me wrapped in 'Visqueen' film too.

A.E.B.



Albert Latham

THE NEXT TEN YEARS

By Sir Charles Ellis, F.R.S.

Sir Charles Ellis, well known for his work as former scientific adviser to the government, takes a peep into the future. He believes that triumphant technology will shape our lives even more by reason of advances in chemistry and metallurgy than through atomic energy; and he sees shortage of fuel as our Achilles Heel.

Reprinted in abbreviated form by courtesy of the Charrilock Magazine

CRYSTAL gazing is the oldest pastime of the human race, and if I indulge too in this game it is because I believe it is possible to foresee some of the features that will affect us in the years to come. To make predictions with any pretence of detailed accuracy would be absurd, because it only requires the emergence of one great man to change the entire situation. A reborn faith in religion or the birth of a new ideology could alter the whole tide of events in a nation's history. Such things are unpredictable, but this does not make it impossible to apply a certain amount of reasoned argument to the time ahead.

There are many striking things taking place around us today: there is the great increase in the speed and in the ease of communication. New York and Edinburgh are equally accessible or remote from London. Millions of people can now not only hear but see one man speaking. It is a sobering exercise to enquire if the human race has so developed that it can produce any men capable of fulfilling properly such responsible and stupendous tasks.

This concentration of world-wide recognition and responsibility on a few individuals will increase. The advances in medical science are changing our relationship to our physical surroundings; children are surviving who would never have done so twenty years ago; people are remaining active and remaining in the direction of affairs to a more advanced age.

The tale could be carried on and atomic energy could be cited, but I shall not do this. I believe that atomic energy has caught the public mind to such an extent that it puts other developments out of proportion, and that there are other things happening which will have a greater effect in shaping our lives. I am referring particularly to the chemical and metallurgical industries.

Polymer chemistry provides one example. This is the branch of technology which provides nylon stockings, polythene bags, uncreasable materials for clothes, artificial leather. All of these are now accepted as part of life today; in fact, they are no longer looked on as substitutes for some natural product but have won a position in their own right.

This is a very significant point. In the past we have been dependent on natural products, and our habits and manner of life have been moulded to a considerable extent

by the properties of these materials. Our clothes were made of wool, cotton or silk. Wood has for centuries been one of the main constructional materials. Escape from this dependence on nature started a long time ago; the synthesis of dyes is just within the memory of some people living today, artificial rubber is relatively recent; but now this is no longer just a number of isolated instances, the trickle has become a torrent.

This is the dominant fact of today. These materials, nylon, 'Terylene,' polythene, polyvinyl chloride, are completely new substances that never existed before they were made by deliberate processes of chemistry to have predetermined properties. Gases from an oil refinery can

be caused to combine into more complicated substances, and by one of the modern wonders of chemistry the molecules of these substances can be made to join end to end and form a long string of identical links. This process of polymerization, as it is called, leads to macromolecules of the type that occur in natural substances like cellulose or wool or silk, and in the laboratories and factories of today processes



... just a little left over

are being carried out that previously only occurred by the mystery of growing life.

But now these processes are happening at our choice and under our direction, and leading to substances that have never existed before in the world. They are not made blindly but are built to have certain definite properties such as quick drying or non-creasing, or great strength under certain conditions, or power to melt just once but never again, or high electrical insulating power or special resistance to acids or to alkalis. Is not this really the first step towards the mastery of the material world?

Polymer chemistry is the most striking example of today's triumphant advancing technology, but the advance

is happening in every subject. Titanium is a wonderful metal that is only now becoming available. Germanium is transforming the electronic industry and making possible the construction of radio receivers and similar things which are not only lighter and smaller but which have far longer lives than was ever thought possible. In the living world, in the production of growth promoters and in insecticides, progress is equally rapid. With the possibility of small packaged atomic reactors that can be transported by air there is literally no part of the world where it is not possible at least to consider starting up an industry.

Our progress towards mastery of the physical world is advancing at a pace that justifies the flamboyant term I have used—the triumphant technology of today. This is one of the big trends of the next decade and one which will play a determining part in the course of events. It is a cheerful picture to contemplate. This country will be in the midst of these advances, and I have no doubt that we have the ability to play a worthy part.

But now let us look at something that is not so pleasant, something that is in fact awkward.

Leaving aside whether it is a good thing to have done, I think everyone will agree that this country has bought the Welfare State on the hire purchase system. Nothing is more certain than that no political party is going deliberately to reverse this policy and do the equivalent of returning the television set and the washing machine: the facts of life are that we shall continue with our payments.

This means that we must increase our total national productivity, a phrase that today has as familiar a ring as one of the advertisements on ITV. By repetition it has become almost a meaningless phrase and just conjures up a lovely picture of future prosperity, but unfortunately that is by no means necessarily true. If we only produce enough just to meet the hire purchase instalment, this country will get poorer and poorer and shabbier and shabbier. We have got to make more than that, and keep some for working capital.

Let us suppose that through the impact of hard economies or through leadership there really does grow up in this country a national will to work harder and to produce more: this should certainly be possible; we have just got to ride on the crest of this advancing technology, use our inventiveness, use automation, substitute machines for men. It is a nice picture to think of, lovely clean factories,



... to consider starting

clean air, men and girls in nice white coats, television and washing machines, everything automatic. Is this going to happen? Perhaps; but it all hangs on one thing—fuel.

All these machines and all these instruments need power to work them, and this power has got to come from somewhere. Can we get the coal, oil or atomic power that will be required? There is a direct relation between the fuel used in industry and the degree of activity of industry; as productivity increases, then inescapably the industrial fuel consumption will also increase.

It has, for example, been estimated that if we are to increase our productivity enough to keep up with our payments and to have just a little left over to improve the situation in this country, then quite apart from having the will to work, we shall also need in 1967 certainly 30 million and perhaps 50 million more tons of coal or its equivalent each year. However much drive is put into atomic energy, however much of our resources we use on this rather than for other purposes, it is out of the question to produce from atomic energy a quantity of energy of this magnitude. We may import more oil, we hope to get some more coal, but the fact remains that energy will be in short supply; fuel will be the limiting factor.

Our fuel supply must come primarily from coal, in fact to the extent of about 80%. If output slackens off, or rather if it does not come up to the increased value that is budgeted for, then all our efforts will be in vain. Thus everything depends on 700,000 miners, about 450,000 of whom work underground.

It is worth pausing to think just what this means in the context of what we guess will be the conditions in the next ten years. In this period surface factories are going to become increasingly modernised, automation will spread, industries will avail themselves of the new technological advances. Workers will not only be more white-coated; they will think and act more white-coated.

What will happen if 450,000 miners are still asked to go underground and carry out their present tasks under the present circumstances of a coal mine? The contrasts of their work with that of the technical factory workers will become increasingly awkward, and unless there is some radical change in the method of coal mining I think it is inevitable that the demands of the miners for more wages will become more and more onerous.

The dilemma is acute, since we have left ourselves no freedom of manoeuvre. Since the war we, as a country, have spent too much of our working capital on amenities, and we have either to increase our income or retrench.

The danger is obvious. The miners may siphon off the country's surplus earnings by the effect of increased wages and all that that brings with it, and however hard the people of this country may work it could happen that the next ten years would be just a nerve-racking effort to keep up appearances and to make ends meet.

A REVOLUTION IN WAREHOUSE DESIGN

by Anne Bilsland (Assistant News Editor)

Paints Division have broken new ground with their revolutionary paints warehouse on several floors. Lack of space made them go upwards. Tins of paint are stacked up to near roof level of a multi-storey building and batch orders are sent down to the packing station by chain conveyor.

How to get a quart into the proverbial pint pot—or, more precisely, how to store 1,000,000 gallons of paint on a site large enough for only about a quarter of that amount—was the knotty problem which confronted the men planning Paints Division's new warehouse. To find out just how they solved it I went down to Slough to have a look at the new warehouse.

Cost of the scheme, the joint brain-child of the Division's Work Study and Engineering departments, has been in the region of £400,000. The building itself stands on what, two years ago, was the Recreation Club's football pitch—at the time the only remaining open space available on the very cramped Slough Works site. Since any spreading out at ground level was out of the question, the designers decided to build upwards. This, I was told, is a revolutionary step in warehouse construction of this type.

The result is the largest, the highest and the first fully

mechanised four-storeyed paint warehouse in the country—probably even in Europe. My two Paints Division guides modestly preferred not to commit themselves about the latter, but they did tell me that we are way ahead in our storing and distributing methods of our opposite numbers in the United Kingdom. Incidentally, the roof of the warehouse can be seen from Windsor Castle: that is why the consent of the Ministry of Works had to be obtained before building could begin.

The warehouse is a large red brick building over 300 ft. long. It consists of a main building, known as the High Building, which is the actual storage area; and an annexe where orders are assembled and packed for delivery to customers.

A novel feature of the High Building is that the outside walls are a mere shell. The actual weight of the 40 ft. high storage racks rests entirely on the ground floor, and the

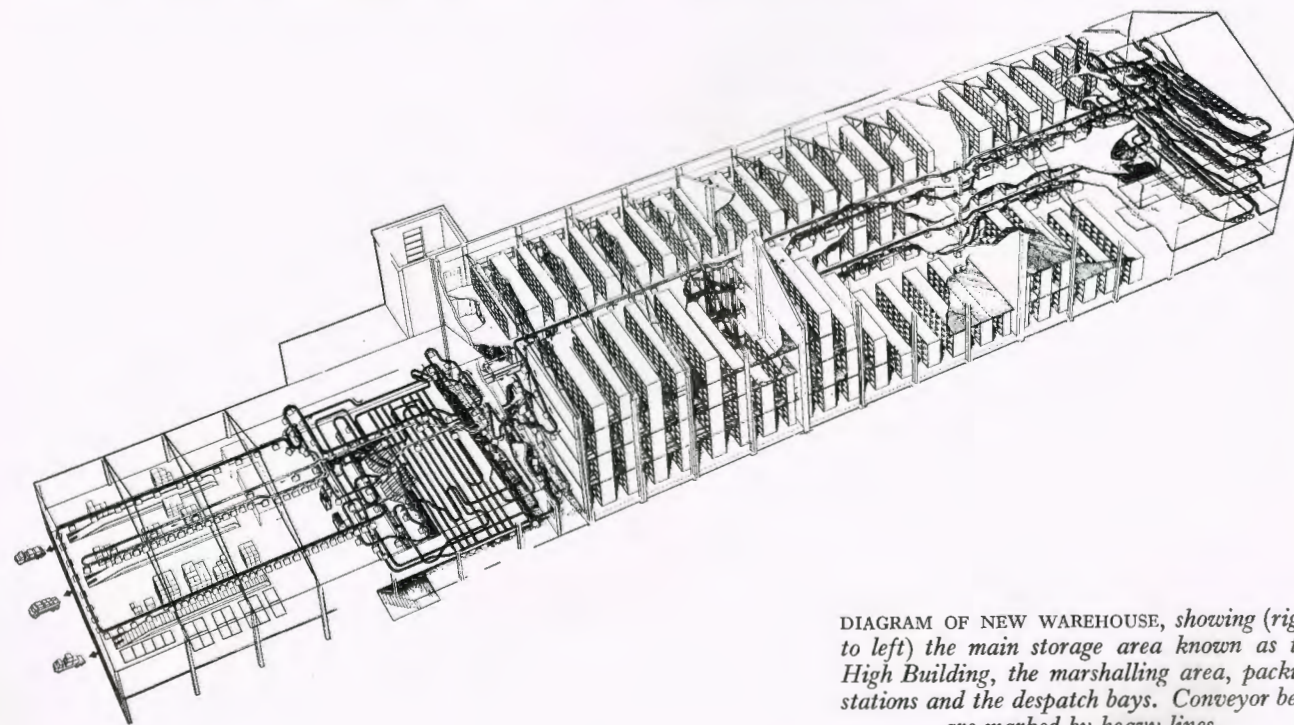


DIAGRAM OF NEW WAREHOUSE, showing (right to left) the main storage area known as the High Building, the marshalling area, packing stations and the despatch bays. Conveyor belts are marked by heavy lines.

upper floors are mere corridors slung between the racks.

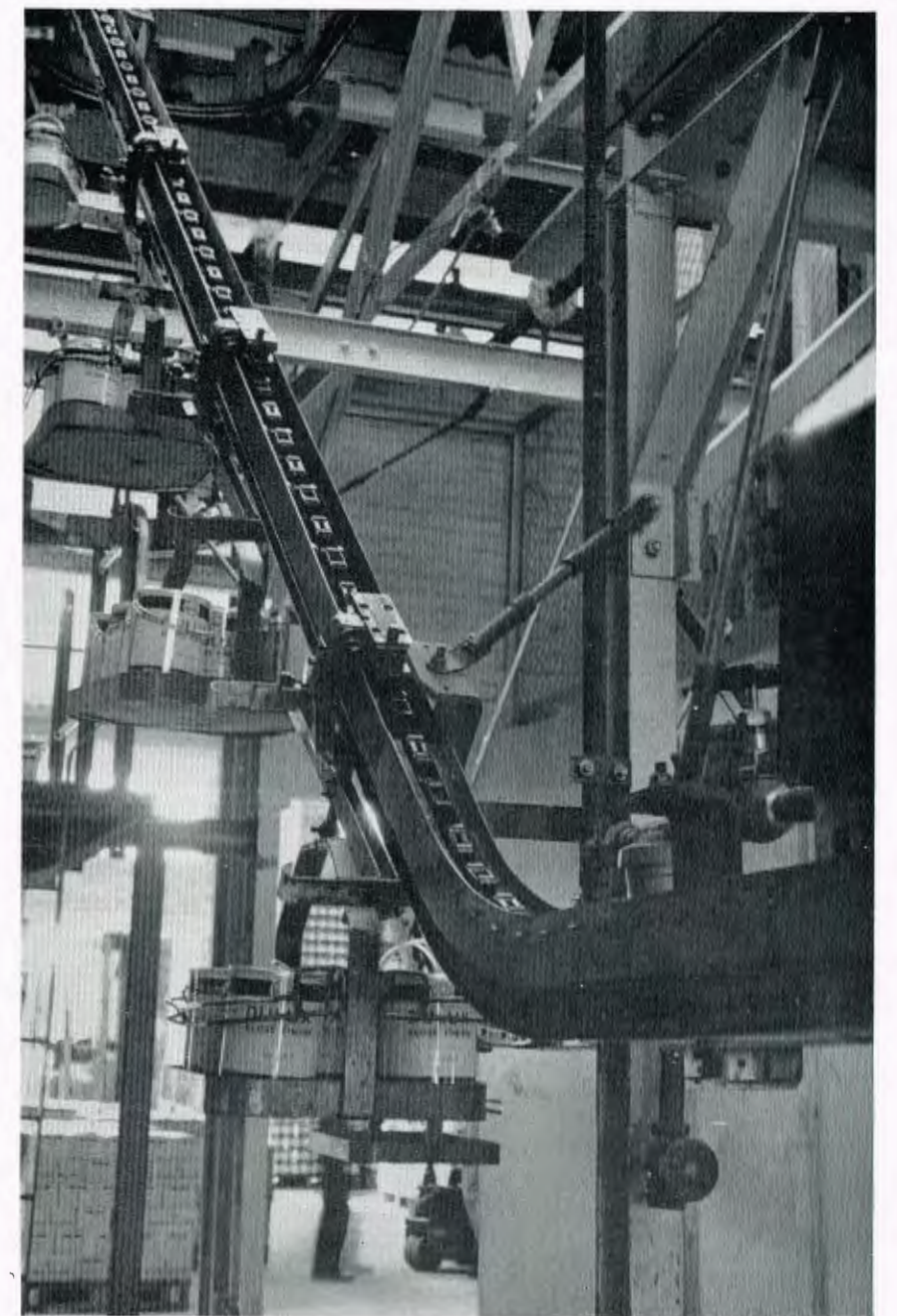
The warehouse contains over 3000 ft. of chain conveyor and another 750 ft. of conveyor belt. The principle behind the conveyor system is that of a railway marshalling yard, but to look at it is more like a Brobdingnagian version of the cash-pulley systems still popular in old-fashioned grocers' shops. The key man is the marshalling lines operator. He sorts out invoices reaching his desk and sends duplicate orders through a pneumatic tube system to the eight assemblers on duty in the High Building.

Paint is stored according to type and colour, and one order may be spread over as many as three or even all four floors. Each assembler collects together his quota of the order, loads the cans on to trays suspended from the overhead conveyor, chalks up the order number on a little flag on the side of the tray and sends it clattering off on its 15-minute journey down to the annexe.

Once in the annexe, the tray is deflected into one of eight marshalling lines. The secret of just how each tray gets into the right line lies in a little key device on the side of the tray. The combinations on the key are adjusted to send the tray to the required destination. Here the marshalling lines operator withdraws all the batches making up one order and sends them on to the packing stations en masse.

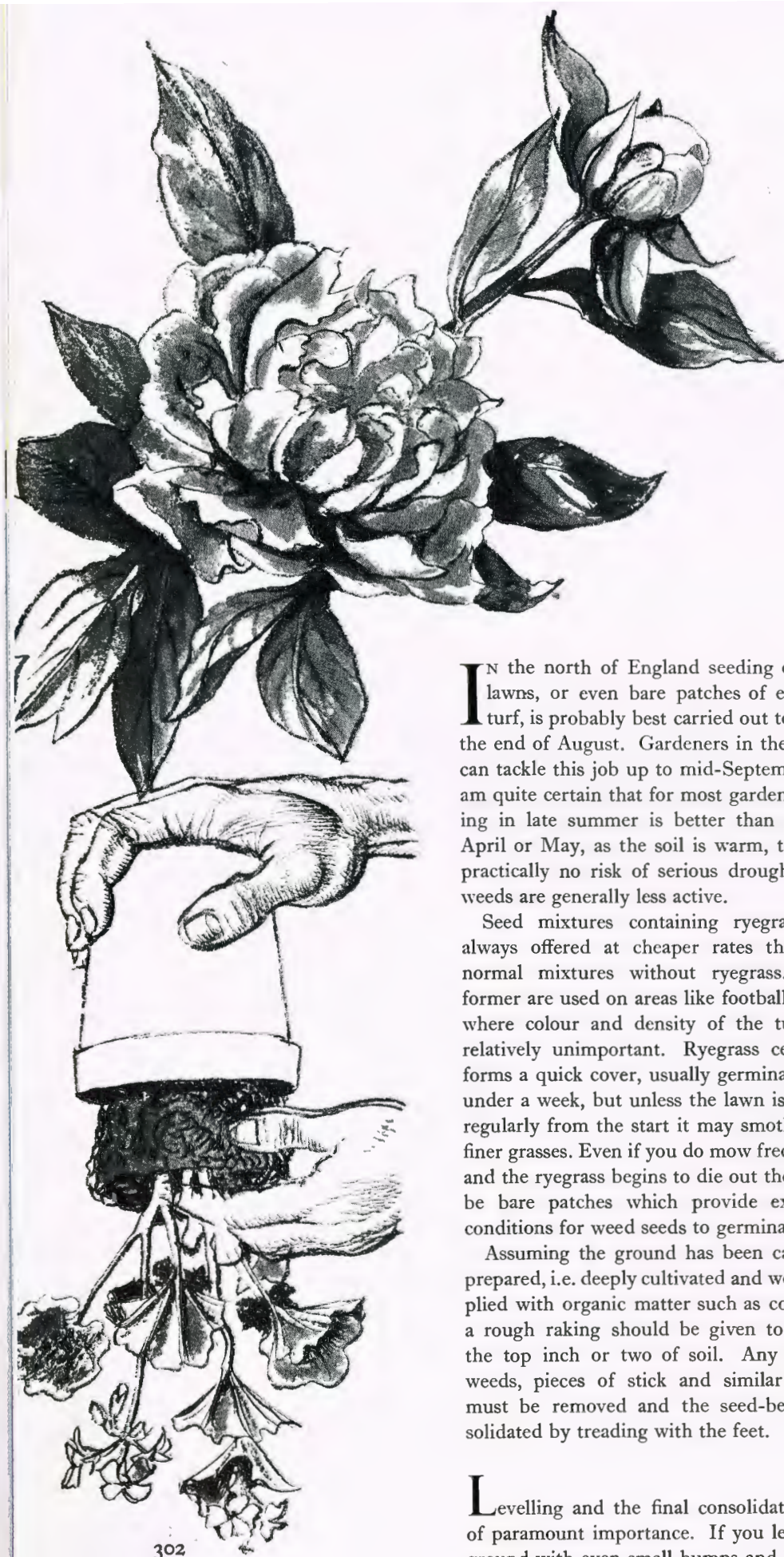
From the packing stations the paint is loaded on to slat conveyors leading out to the loading bays and from there is sent off by road all over southern England.

The final link in the whole scheme was completed last April with the starting up of another conveyor system from the paint filling shop to the warehouse. This second conveyor, which adds another 1000 ft. to the already impressive amount of conveyor in the warehouse, is housed in an overhead bridge 250 ft. long. Until April, filled cans of paint had to be brought over to the warehouse by truck. The new conveyor cuts to a matter of hours instead of days the time lag from the point where the vats of newly made paint are brought into the filling shop to the point where the filled cans are on the warehouse shelves, ready to be sold.



A STRETCH OF CHAIN CONVEYOR in the Slough warehouse. Loaded trays are climbing to the bridge en route for the High Building.

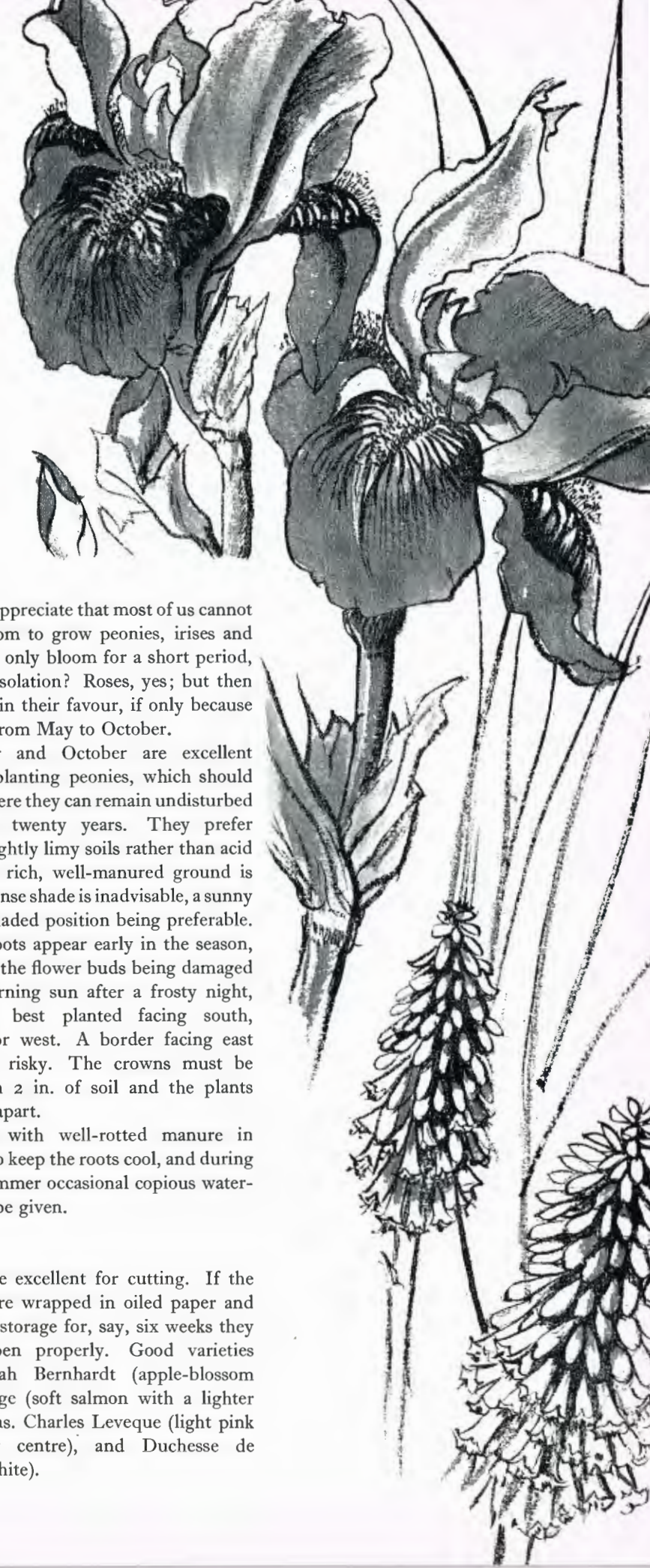
It is hard not to burst into superlatives when describing the warehouse scheme. Everything seems to fall into the category of "the newest," "the largest" or "the latest." Although it has only been in operation a matter of months, results already more than justify the clean sweep that has been made. Already the distribution department is handling daily a far larger tonnage than would have been possible a year ago. The all-time record was achieved last June, when 344 tons were sent out in one day.



Garden Notes

By Philip Harvey

Illustrated by Edith Hilder



IN the north of England seeding of new lawns, or even bare patches of existing turf, is probably best carried out towards the end of August. Gardeners in the south can tackle this job up to mid-September. I am quite certain that for most gardens sowing in late summer is better than during April or May, as the soil is warm, there is practically no risk of serious drought, and weeds are generally less active.

Seed mixtures containing ryegrass are always offered at cheaper rates than the normal mixtures without ryegrass. The former are used on areas like football fields, where colour and density of the turf are relatively unimportant. Ryegrass certainly forms a quick cover, usually germinating in under a week, but unless the lawn is mown regularly from the start it may smother the finer grasses. Even if you do mow frequently and the ryegrass begins to die out there will be bare patches which provide excellent conditions for weed seeds to germinate.

Assuming the ground has been carefully prepared, i.e. deeply cultivated and well supplied with organic matter such as compost, a rough raking should be given to loosen the top inch or two of soil. Any stones, weeds, pieces of stick and similar debris must be removed and the seed-bed consolidated by treading with the feet.

Levelling and the final consolidation are of paramount importance. If you leave the ground with even small humps and hollows it may be very difficult to get rid of them

when the lawn is established. Other problems are fortunately easier to master. You can eradicate lawn weeds by means of 'Verdone,' failure to supply sufficient organic matter can be corrected by working in suitable materials at any time, and soil deficiencies can be similarly adjusted. Even drought can be countered by the systematic use of a sprinkler; but an irregular surface is a perpetual nightmare, and I can assure you that I speak from bitter experience. The lawn in my garden is certainly a pleasing green and stands up reasonably well to dry spells without much artificial watering, but the previous owner obviously neither levelled the ground properly when the lawn was prepared, nor did he make any attempts to correct the numerous depressions.

There is, alas, only one solution. Complete reseedling or turfing, and neither method is likely to prove inexpensive, as there is a fairly large area of grass.

To ensure the maximum consolidation it is best to tread north and south, rake the surface, tread again crosswise, and then give a final raking to secure a fine tilth. Rolling is an alternative to treading with the feet, but is not necessarily better in the long run. Ideally, to quote a well-known authority, "no particle of soil should be greater than a grain of wheat." However, if the lawn is relatively small and the ground is not too heavy, this is not difficult.

A quick-acting complete fertilizer should be worked in about ten days prior to sowing.

Grass seed should only be raked in very lightly. To prevent sparrows and other birds eating the seed there is probably nothing better than the old-fashioned method of stretching black cotton tied to twigs across the area.

Although, as already mentioned, a top dressing of complete fertilizer is helpful if applied ten days before sowing, fertilizers containing inorganic nitrogen should not be given to *established* lawns in autumn or winter, as they tend to encourage lush growth which is more susceptible to fungus diseases.

There is, however, still time to apply 'Verdone.' Indeed, where daisies are troublesome and you have omitted to tackle them earlier in the year, a September application is well worth trying, as these weeds often succumb more readily at this time of year and a second treatment may be unnecessary.

It is an old saying and a very true one that gardeners never hurry (experienced ones, at any rate!). Certainly anybody who plants a peony and expects rapid results is liable to disappointment, as some varieties refuse to bloom for several years after moving. I read recently in a gardening book by a very well known horticulturist that when peonies flower they are so beautiful that they deserve a border to themselves! When will some of these extremely knowledgeable, highly skilled and otherwise sensible gentlemen who have spent most of their working lives as head gardeners, or on extensive nurseries and other places where space is not necessarily at

a premium, appreciate that most of us cannot spare the room to grow peonies, irises and so on, which only bloom for a short period, in splendid isolation? Roses, yes; but then I am biased in their favour, if only because they flower from May to October.

September and October are excellent months for planting peonies, which should be placed where they can remain undisturbed for at least twenty years. They prefer neutral or slightly limy soils rather than acid land. Deep, rich, well-manured ground is essential. Dense shade is inadvisable, a sunny or slightly shaded position being preferable. The new shoots appear early in the season, and to avoid the flower buds being damaged by early morning sun after a frosty night, peonies are best planted facing south, south-west or west. A border facing east is obviously risky. The crowns must be covered with 2 in. of soil and the plants spaced 3 ft. apart.

Mulching with well-rotted manure in April helps to keep the roots cool, and during a hot dry summer occasional copious waterings should be given.

Peonies are excellent for cutting. If the tight buds are wrapped in oiled paper and kept in cold storage for, say, six weeks they will still open properly. Good varieties include Sarah Bernhardt (apple-blossom pink), Solange (soft salmon with a lighter centre), Mons. Charles Leveque (light pink with darker centre), and Duchesse de Nemours (white).

The Glassmakers

By Anne Bilsland

The famous firm of Pilkington Brothers gave the free run of their sheet-glass factory at St. Helens to our artist and writer. Here they record the story of how glass is made—a story in which I.C.I. soda ash and saltcake play an indispensable part.

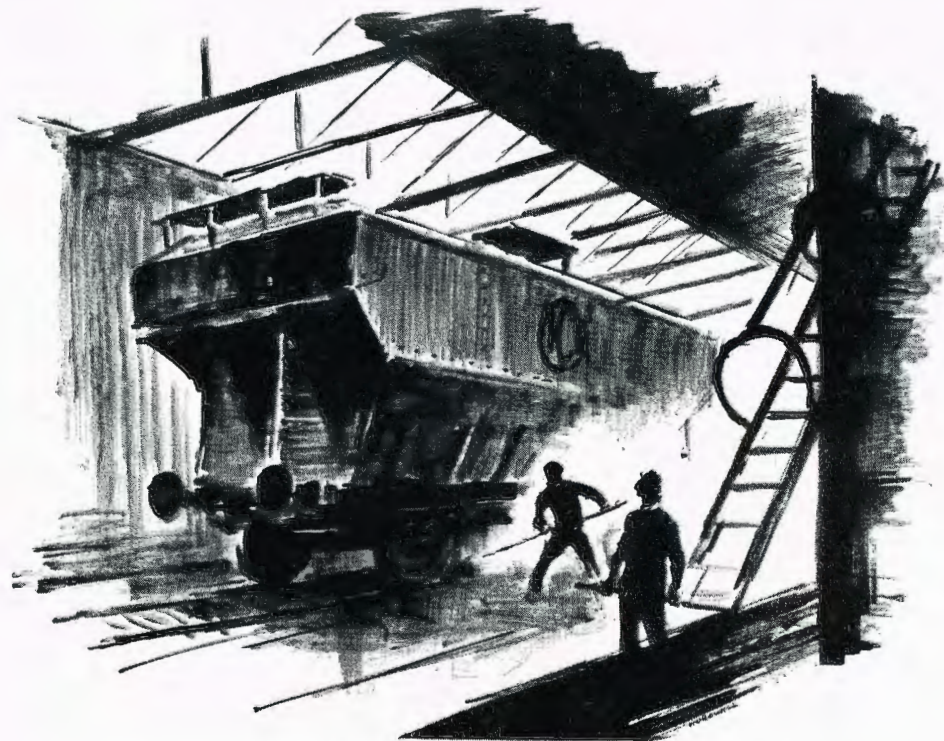
Drawings by Arthur Horowicz

ST. HELENS and glassmaking—you no more think of one without the other than you think of Manchester without cotton or Liverpool without shipping. And about midway between these two

cities lies St. Helens, conveniently close to its sources of raw materials, which include soda ash and saltcake from I.C.I.

There are many sides to glassmaking—from sheet glass and plate glass to optical lenses and glass for atomic reactors. Measured by the ton, sheet glass—the glass used for windows—is, as one might expect, the biggest line.

Raw materials for glassmaking are sand, soda ash, dolomite, limestone and saltcake—in that order. Almost hourly 40-ton trucks carrying soda ash from Winnington, dolomite from Doncaster, limestone from the unique Halkin Mountain mine forty miles away in North Wales (unique because it is mined 800 feet below sea level), and sand from the pits at nearby Rainford arrive at the sidings of the Sheet Works of Pilkington Brothers Ltd.,



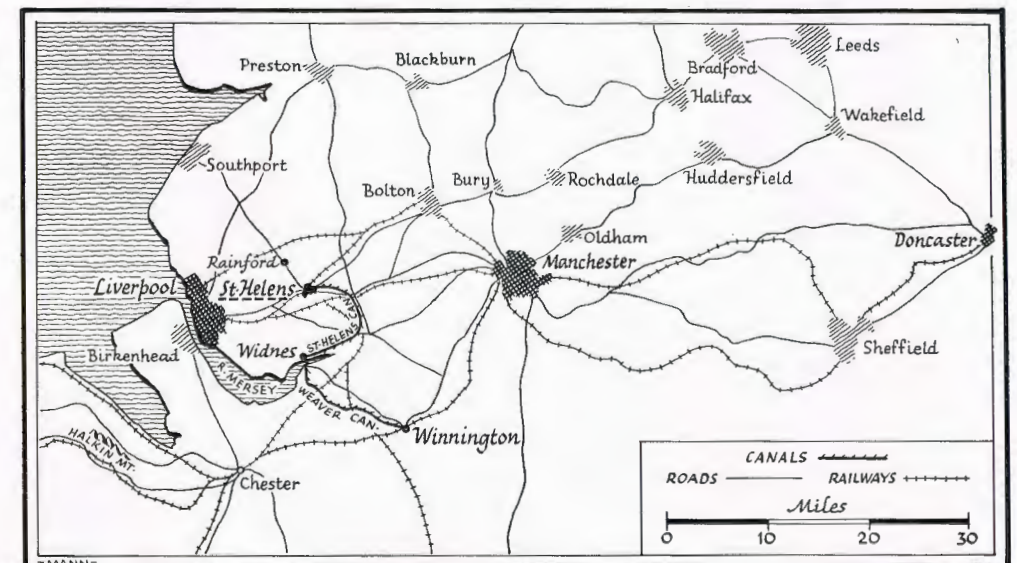
Soda ash from Alkali Division's Winnington Works arrives in a specially designed I.C.I. hopper wagon. Nearly 1000 tons of ash a week are used.



Scrap glass, which glassmakers call cullet, lies outside the furnace building for remelting in a mix

the only flat glass manufacturers in the British Isles and one of the largest in the world, although they are of course in other lines as well. Incidentally, it is the purity of this Rainford sand, almost without trace of iron, that has gone a long way to giving St. Helens its commanding place in the glass industry.

I went first to the mixing plant. Mixing is centralised, and the final mixture is called



Geography explains why St. Helens is the traditional glassmaking area of Britain. Soda ash comes from Winnington, dolomite from Doncaster, limestone from North Wales, sand from nearby Rainford.



The raw materials—sand, soda ash, dolomite, limestone and saltcake—are brought to the furnaces in 3000 lb. skiploads

“frit.” This is despatched in hopper trucks, 3000 lb. at a time, to the six “tanks” in which glass is made.

I watched the incoming trucks of soda ash being shunted into the mixing sheds, where the ash is dropped through a grille into an underground bunker. From the bunker it is hauled up by bucket lift (working on the escalator principle) and fed into an enormous silo. The plant foreman estimated that he must deal with nearly 1000 tons of ash a week.

Ranged alongside are the sand, dolomite and limestone silos, and at the end of the row, like a cox beside his crew of heavyweights, a small silo for saltcake. This saltcake, or sodium sulphate to give it the correct name, comes from General Chemicals Wigg Works at Widnes. The most important raw material, if you go by weight, is sand. In every 3000 lb. batch of frit there is roughly 1800 lb. of sand, 440 lb. each of soda

ash and dolomite and 100 lb. of limestone and saltcake.

The actual mixing of a batch of frit is an automatic process operated and watched over by a supervisor and his mate up in the glass-walled control room. At the touch of a lever, sand, ash and limestone start tumbling out of the silos on to electrical weighbridges and from there on to a moving conveyor belt below. It is the proud boast of the mixing plant men that they can deal with no less than twenty-four batches an hour at a peak period.

The far side of the control room overlooks the end of the conveyor, where the raw materials are tipped into a huge skip. When full, this is lifted on to the mixer. On a little platform beside the mixer a lone workman boasting the *What's My Line* title of skip-bottom-knocker wields a hefty mallet. His job is to bang the bottom and sides of the skip and make sure that every ounce of the ingredients gets into the mixer.

Lastly, very small quantities of anthracite and water are added and the whole batch is thoroughly churned for five minutes, when it is ready for the tanks.

My next port of call was one of the “glass tanks.” These are low brick furnaces 120 ft. long by 36 ft. wide heated by a battery of gas stacks down either side. The skiploads of frit are brought in on an overhead railway and slowly tipped into the side of the tank. At this stage too, cullet (broken glass) is fed into the tanks. Large mounds of scrap glass lie all around the building. Even blindfold it would be impossible to mistake one's whereabouts, for there is a tell-tale crunch at every footstep. None of it is wasted, as cullet forms an essential ingredient in modern glassmaking. It plays an important part in assisting the melting and binding of the raw materials.

In the tank the frit and the cullet are heated to a temperature of 1530° C., that is, about five hundred degrees above melting point. This is done by powerful producer gas flames. The two batteries of gas stacks operate alternately every twenty minutes.

To a layman there is something almost miraculous in the way the dirty mixture is transformed, merely by heating, into a gleaming white-hot pool of liquid in the tank. The tank is run continuously for several years, and it holds over 1200 tons of “metal,” which is the name they give to the liquid glass. Glassmaking is hot work, and the tank building was littered with large bins labelled “tea-leaves.” In the old days, when all



Inside the furnace a temperature of 1530° C. transforms the raw materials into a treacly liquid which is drawn and cooled to make sheet glass

the glass was blown by hand, there was even a daily beer ration.

The modern method of glass drawing—the last and most intricate stage in sheet glass making—was perfected in 1931. At the far end of the tank the molten metal is cooled to about 900° C., at which temperature it reaches a gluey consistency. From this dull red treacly mass a thin ribbon is slowly pulled up through a cooling tower. By the time it reaches the top of the tower, three floors up, the ribbon of glass has hardened into a solid sheet and is almost cold.

Gradual cooling is one of the secrets of glassmaking. If cooled too abruptly, it is brittle and easily shatters.



Patterned plate glass is made by running hot, soft glass from the furnace over engraved rollers

Each tank has four or five drawing towers and drawing goes on continuously, the glass being cut off automatically piece by piece as it reaches the top of the tower and lifted clear by a large suction clamp. On its journey up the tower the glass passes through twenty-two pairs of asbestos rollers. The thickness of the glass sheet is regulated both by the rollers and by the speed of drawing.

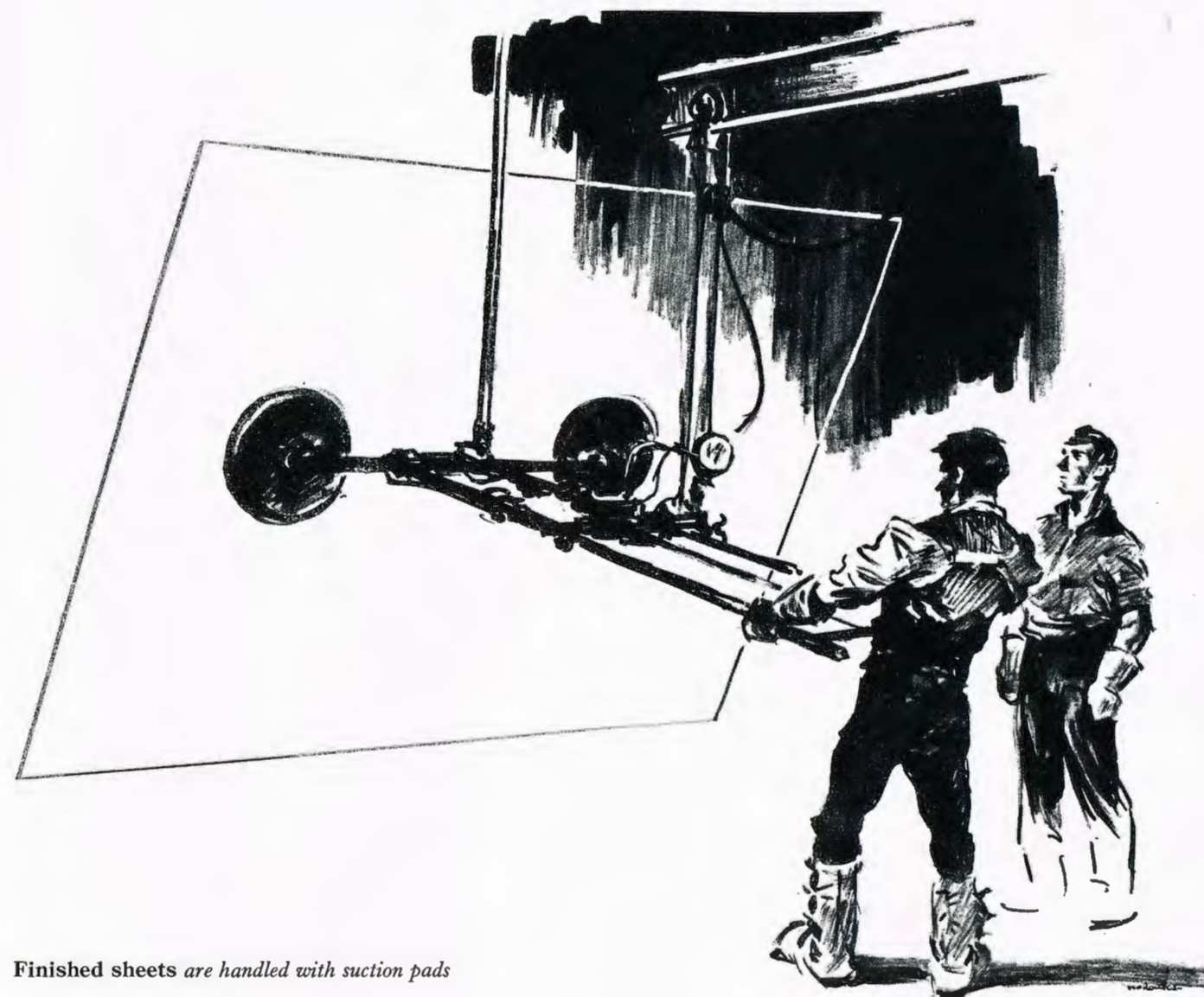
Each piece of glass as it comes off the drawing tower is removed to a nearby bench where a couple of workmen, well protected by long leather sleeves buckled together across their shoulder-blades and enveloped in leather aprons, trim off the rough edges with a diamond cutter and check it for flaws.

Later, in the glass warehouse next door, I watched

a team of girls cutting these same sheets into hundreds of small discs—the tiniest size about 2 in. in diameter was destined for dial faces in gas meters and for car dashboards.

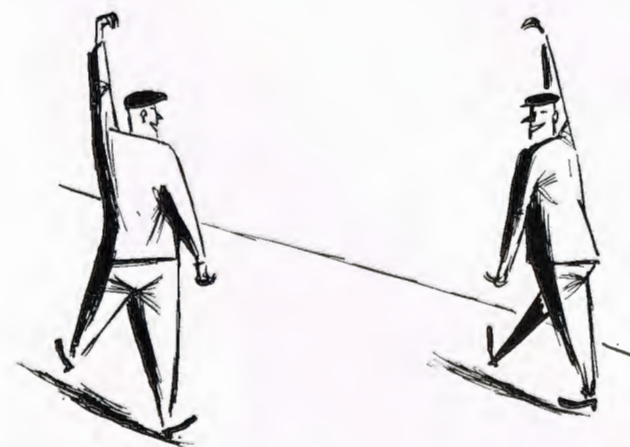
Nearby I watched “rolled plate” glass being made. This is the method mainly used for making figured and patterned glass or wired glass. Here the hot, soft glass flows out of the tank between huge water-cooled rollers into a lehr or cooling oven. At this point the surface of the glass is still very soft, and it takes the pattern engraved on the rollers.

Wired glass—mostly used for roofing—is particularly fascinating to watch being made. A roll of wire mesh is lowered down inch by inch on to a moving sheet of hot treacly glass fresh from the tanks.



Finished sheets are handled with suction pads

On this is dropped a second stream of the “treacle” and the whole is forced through a heavy roller to make a permanent sandwich. From here it travels over



another sixty-odd feet of rollers, by which time it has slowly cooled and hardened. The rate of drawing varies from about 50 in. to 250 in. a minute according to the thickness or type of glass required.

Glass from the sheet works is sent out daily in huge quantities by road and rail, destined for all four quarters of the globe—yes, Pilkington’s glass even penetrates to such remote outposts of the Commonwealth as Tonga.

Today, every new house that is built, from John o’ Groats to Land’s End, and each car that runs off the production line at Oxford, at Luton or at Dagenham, has windows of Pilkington glass. And behind it all there are the wagonloads of Rainford sand, of Yorkshire dolomite, of Welsh limestone and of soda ash from Winnington destined for the ever-open jaws of the St. Helens glass furnaces.

People and events . . .

THE new Synthonia Club theatre at Billingham, recently opened by SIR ALEXANDER FLECK, is said to be one of the best in the North of England.

The new building is the same size as the one opened by Lord Melchett in 1930 and largely destroyed by a German bomb in 1942.

The main body of the theatre will seat 400, the gallery 70. The foyer and auditorium are panelled in mahogany and sycamore. The stage and its equipment are up to the best modern standards.

The stage is 25 ft. wide, with 9 ft. wings, and 27 ft. deep. On one side is a complete scenery dock and furniture store. A "flying" space above the stage enables full-size scenic flats and cloths to be raised out of sight in one piece.

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The theatre is much more than a theatre. As the main centre of the club's social life it is also a hall for dances and social events.

George Bernard Shaw once visited the Synthonia Club during a tour of Billingham. Having seen the stage, he is alleged to have said that any of his plays could be presented there without payment of royalties.

It seems that G.B.S. reckoned without his agents—or perhaps he just changed his mind. In any event, when the club people approached the agents and reminded them of Shaw's offer they were told: "Not on your life—you pay the same as everyone else!"

War Story

WHEN the *Glasgow Evening Citizen* ran a competition for the best war story recently, MR. DOUGLAS GOODALL, a sampler in the analytical department of Dyestuffs Division's Grangemouth Works, sent in the winner.

It was an account of the 23 days he spent on a raft in the Indian Ocean in 1943. Mr. Goodall, fourth engineer of a cargo ship, and two lascars seamen climbed aboard the raft after the ship was torpedoed.

Their supplies were half a gallon of water and a small ration of biscuits, chocolate, meat extract and malted milk tablets. Mr. Goodall caught pilot fish for them to eat, and a providential fall of rain saved them from dying of thirst before they were picked up and taken to an Australian port.

What Mr. Goodall does not tell in the newspaper story is that he was awarded the M.B.E. for saving the lives of the two lascars.

Impending Riot at Narkover?

AN Isle of Wight schoolboy recently wrote to I.C.I. as follows: "Please will you send me some booklets on



guns and who to shoot because I am getting very interested in the sport."

The letter has been passed on to Metals Division's Sporting Ammunition Department. Let's hope they tell the little chap just what's sporting and what isn't.

It's Light, it's Bright

ABOUT 25% of the 'Alkathene' sold on the home market now goes into houseware—bowls, buckets, bins, colanders, salad-shakers, lemon-squeezers, funnels, watering cans, baby-baths, shopping baskets and such-like.

Probably no one knows how many separate 'Alkathene' articles are being made every year. But every month a million labels carrying the name 'Alkathene' are sent out to trade moulders who stick them on polythene merchandise before they leave their works.

Last Voyage

THE 250-ton motor vessel *Piri*, used by I.C.I.A.N.Z. for carrying explosives from Australia to New Zealand, had an adventurous crossing of the Tasman Sea on her last voyage before being sold.

400 miles off the New Zealand coast she met violent storms and lost her rudder. The crew managed to rig a jury rudder, but they eventually arrived at Auckland under tow.

Piri has carried thousands of tons of explosives during her 30 years with I.C.I.A.N.Z. She started life as a top-sail schooner, built in Sydney in 1907, and made her first three trips for the Company under sail. An engine was then installed and she was converted to an auxiliary schooner.

China Trade

AS soon as the Foreign Secretary announced that the strategic embargo on goods for Communist China was being relaxed, Dyestuffs Division cabled the I.C.I. office in Hong Kong, offering supplies of rubber chemicals.

Four days later a cable came back ordering 23 tons of 'Vulcafor' MBT, a chemical used in the vulcanisation of rubber. According to the British press, this was the first order to be obtained from China after the relaxation of the export restrictions.

It has been permissible to export natural rubber to Communist China for some time, but not the chemicals which are needed to turn it into such

things as tyres. The new arrangements put exports to China on the same basis as those to the Iron Curtain countries and Russia—a logical move, since the Chinese have in the past used Russia as a buying agent for materials they could not import directly.

Dyestuffs Division now has good hopes of establishing a worth-while business with China for other rubber chemicals.

Factory Guide

AT his work in Billingham Gas and Power Works during the war MR. HAROLD MOSS was asked suddenly to



Mr. Moss

"get cleaned up to meet some V.I.P.s."

A short while later he met the V.I.P.s. To his complete surprise they were the late King George VI and Queen Elizabeth the Queen Mother, who were paying a visit to the factory in wartime secrecy. Mr. Moss, with MR. JOHN PEARSON, who is a control room engineer in the Power Plant, was presented to the royal couple as a representative of Gas and Power Works. They were presented by SIR ALEXANDER FLECK, then Billingham Division chairman.

Mr. Moss recalled this highlight in his life at a ceremony to mark his retirement after 29 years' service. For the past seven years he has shown countless visitors round Billingham as the factory's guide.

Foams on TV

IN the first performance of the B.B.C. television programme "What's New," a musical magazine which introduces new items of interest and entertainment, one of the subjects dealt with was isocyanate foams.

DR. R. B. WATERS and MR. E. PACKER of Dyestuffs Division gave faultless demonstrations of making rigid and flexible foams in laboratory equipment actually in the television studio—no mean task amid the seeming chaos of wires, cameras, singers and dancing girls which prevails in a mixed programme of this sort.

Exhibits showing some of the applications of these versatile products were screened as well. People in the studio anxious to see the wonders of modern science thought the isocyanate display was the most interesting part of the programme.

The isocyanates and polymers from which these remarkable foams (as well as hard, heat-resisting surface coatings and rubber-like materials) can be produced are made at Huddersfield Works. An article on the products and their uses will appear soon in the Information Notes section of the *Magazine*.

Advice to Apprentices

DON'T let yourselves be spoon-fed. Whatever you do in life, go out with a keen, interested mind. Accept what you think is good. If, however, you have a doubt about anything, ask questions, and don't accept the answers unless you are satisfied that they seem reasonable and proper."

This was some of the advice SIR EWART SMITH, a deputy chairman of I.C.I., gave to apprentices when he opened the new Ardeer Apprentice Training School.

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About thirty new apprentices will be trained each year in the school workshops. The first group of 16-year-olds started in January this year, and a second group began training two months ago.

In his speech Sir Ewart commented on the country's educational system. "Not outstanding in its search for change" and "perhaps one of the most conservative features of our national life" was how he described it.

Scots, whose educational system is separate from that of the rest of Britain and (they think) better, may take issue with him here!

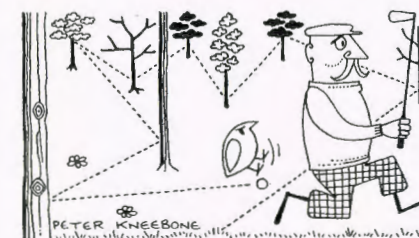
Golf at Wilton

A CLUB with an annual subscription of £2 is probably the dream of many aspiring golfers.

At Wilton the dream has come true, and since the nine-hole course was opened just over a year ago the golf section has achieved the largest membership of any section of the Recreation

Club. Many of the 300 members are beginners, and they can hire clubs for 6d. a round.

The golf course architect who laid out the course, Mr. J. S. Morrison, designed it round the trees so as to



compel accurate placing of shots if par figures are to be obtained. There is only one sand bunker.

With beginners in mind, the club management has eliminated the rough entirely. This makes the fairways easier to maintain, and there are fewer delays in the course of play.

Beginners can have lessons cheaply from the professional—in winter there are weekly lessons indoors—and many have reduced their handicaps. One of them, MR. BERNARD PARKINSON, who had not then achieved a handicap, holed out in one at the third quite early in the history of the course and won the tankard offered by MR. P. C. ALLEN to the first person who did this.

Aerial Work Study

SOME striking examples of the success which Work Study is meeting in non-industrial applications have been given by SIR EWART SMITH in a recent article in the *Financial Times*.

Quoting Air Vice-Marshal W. L. Freebody, who was trained in Work Study by I.C.I., Sir Ewart recorded that it was now possible for four men to refuel and rearm a Hunter aircraft instead of ten, a time-saving of one-third; and the procedure of an airman joining a station had been cut from a day to forty minutes.

In agriculture, said Sir Ewart, modifications to layout indicated by Work Study and improved routine had raised the number of pigs which one man could look after from 480 to 1280. In general, the higher productivity resulting from Work Study was seldom less than 20% and averaged 40-60%.

Building Down Under

THE great construction programme begun by I.C.I.A.N.Z. eighteen months ago is nearing completion.

£A7 million is being spent, and here are the results:

Central Research Lab., Ascot Vale. Completed.

Deer Park Recreation Club. Completed.

I.C.I. House, Sydney. A ten-storey office block. Should be ready for occupation this month.

I.C.I. House, Melbourne. The city's first "skyscraper." 230 ft. high. Should be ready for occupation in September next year.

Polythene Plant, Botany. Should be ready by the end of the year. Cost £A2 million.

Plastics Lab., Ascot Vale. Ready by the end of September.

New S.C.I. President

AT the Society of Chemical Industry's 77th annual general meeting Mr. H. GREVILLE SMITH, C.B.E., president of C.I.L., was elected president of the society. He succeeds Mr. Julian M. Leonard.

Mr. Greville Smith is a Sheffield man who left Billingham for I.C.I. (New York) in 1929 and became manager of the chemical development department of C.I.L. in 1932. He was elected president of the company in 1951. He received his C.B.E. in 1944 for his work during the war, when he was responsible for some \$1000 million worth of defence production for the Canadian Government.

* * *

The Society of Chemical Industry's gold medal was awarded to Mr. W. J. Worboys, commercial director of I.C.I.

The list of the society's medallists—there have been thirty in sixty years—is a distinguished one. It starts in 1896 with John Glover, who began life as a

NEWS IN BRIEF

FIRST TURF. The first turf on the 7-acre site for Wilton's fourth polythene plant was cut by Mr. David Anderson of Winton Engineering Dept. and taken back to Alkali H.Q. in a 'Perspex' case designed for the purpose.

ARTISTS' QUARTER. Of the 65 pictures hung at the annual exhibition of the New Cunningham Art Club in Saltcoats 16 were by spare-time artists at Ardeer or Nobel Division headquarters.

MORE POLYTHENE. Construction work will begin later in the year on additions to C.I.L.'s polythene plant at Edmonton, Alberta. Aim is to double present capacity—now 20 million pounds a year.

BLOOD DONORS. A record of 514 people came forward to give blood when the Blood Transfusion Service visited Ardeer.

LAST VOYAGE. The last trip under the I.C.I.A.N.Z. flag for 30-year-old m.v. *Piri* was also a farewell trip for her master, Capt. M. W. Monaghan, who is retiring after 36 years' service.

SCOUT GREEN. The 50 Austin vehicles lent to the Scouts' Association for the Sutton Coldfield Jamboree were all finished in I.C.I. paints, 49 of them in a shade known as "Scout Green."

AT HOLYROOD. Mrs. C. B. Wilson (Nobel Division), a Red Cross cadet officer, was at Holyrood House for Princess Alexandra's inspection of the Scottish branch of the Junior Red Cross.

RUSSIAN VISITOR. The Soviet Minister of the Chemical Industry, Mr. S. M.

Tikhomirov, visited Wilton during a tour of chemical and plastics works in Britain.

STOWMARKET EXPANSION. A 21-acre expansion scheme including new laboratories, manufacturing buildings, a warehouse and recreation club facilities has been announced for the Stowmarket factory of Paints Division. Work is to start almost immediately.

STARGAZERS. A Billingham amateur astronomer, Mr. Jack Youdale, and former Billingham apprentice David Sinden staged an exhibition of their telescopes, astro-cameras and photographs at Billingham public library last month.

GOURMET'S DELIGHT. A member of Dyestuffs Division, Mr. A. P. Moody, was responsible for organising the Society of Chemical Industry Food Group's summer tour—this year to Switzerland.

5000 STRONG. Membership of Wilton Recreation Club now tops 5000.

PLASTICS IN AFRICA. New equipment costing £250,000 is to be installed at A.E. & C.I.'s 'Vynide' factory at Somerset West. Purpose is to manufacture plastic sheet and film at present imported.

SMITH'S CRISPS. The carton for the new family-size pack of Smith's potato crisps now being widely advertised on ITV was developed by I.C.I.'s Paper Goods subsidiary. Orders are now well past the million mark.

plumber, studied in his spare time at a Mechanics' Institute and later invented the Glover Tower, which revolutionised sulphuric acid manufacture. His is followed by such names as W. H. Perkin, Ludwig Mond, William Crookes, George Pollitt, Herbert Levinstein, E. F. Armstrong, Lampitt, Leverhulme, Dodds and Rideal.

Bugs and Fleas at Billingham

WE hear of design "bugs" in aircraft, but Billingham's Gas and Power Works is troubled with bugs of a more traditional kind—water bugs. These, as well as water fleas and plant life, have infested an emergency reservoir near the power plants.

The answer, adopted so far as an experiment, has been to introduce something of the balance of nature. Half a dozen young king carp brought from a hatchery in Essex have been put into the reservoir in the hope that they will quickly establish their royal

power and make good meals on the bugs and plant life.

Anglers in the factory are living in hopes, for some of the species put into the reservoir have been known to reach 40 lb. in weight. But carp are not easy fish to catch. They feed mainly on the bottom and are very shy. The anglers should remember Izaak Walton's comment: "There is nothing as cunning as the carp."

Birdmen

A.E. & C.I.'s Somerset West factory, near Cape Town, has become quite a renowned port of call for ornithologists.

This is explained partly by the fact that the sand dunes near the factory are the haunt of many of the Union's most interesting birds, and partly by the fact that the South African Ornithological Society's president works at Somerset West. He is MR. COLIGNY MURRAY, chief superintendent of the personnel department. MR. DOYLE

LIEBENBERG, the factory manager, is also a member of the society.

Between them they have welcomed some famous figures to Somerset West. To the Australian authority on sea birds, Dr. Serventy, they were able to show the Cape Sugar-bird. Another visitor was the American ornithologist Dr. Chapin—famous for his knowledge of African birds and for his discovery of the Congo peacock species 25 years after first seeing a wing-feather in the headgear of an African native.

The world authority on humming birds, Dr. Berlioz of the Paris Museum of Natural History, also spent a day at Somerset West.

Keen on Colour

IT looks as if a few people in I.C.I. who have asked their Division information officers for Paints Division's aid to the home-handyman, the Colour Comparator, may be disappointed.

The reason is that the Comparator and its companion booklet *Colour Sense* have been in very great demand. When Paints Division advertised them in the national press, tens of thousands of people wrote in asking for copies.

The offer to I.C.I. people brought just as keen a response, and 4500 copies have been distributed inside the Company. At Wilton alone there were 850 requests for the Comparator—which suggests that one in every ten Wilton employees is a home-handyman.

Mystery Teeth

FOR years the men who handle rock phosphate at Billingham have been finding teeth in the cargoes arriving from Morocco. The teeth are hard, needle sharp, and vary in size from an eighth of an inch long to an inch.

At one time dozens of teeth could be found in each consignment. Now they



have become almost a rarity, although a rich haul was culled from a single consignment recently.

Local opinion is that they are sharks' teeth, or at least the teeth of a fish of the shark family.

Out of the Bag

C.A.T. spells cat. It also stands for Copper, Aluminium, Titanium. That is why Metals Division's new advertisements in the daily press feature a beautiful Siamese.

Along with the cat, a big piece of news has been let out of the bag—the story of Metals Division's latest contribution to nuclear engineering.

This will be a very large quantity—

nearly 400 miles—of 'Integron' finned tubing for the new atomic power stations at Bradwell and Berkeley. 'Integron' is made specially for the job of heat exchange (transferring heat from one liquid to another), and now Metals Division has evolved a type which is particularly suitable for the nuclear reactors.

Nylon Wood

THE story of how nylon can be used to make finely balanced bowling "woods" is told in British Nylon Spinners' newspaper, *Signpost*.

An American, Mr. Norman Angell of California, turned out against the Monmouthshire team on the B.N.S. green at Pontypool recently using nylon woods of his own making.

CONTRIBUTIONS for this feature are welcomed and paid for.

There is no secret about how he does it. He builds up layer upon layer of nylon tyre-cord fabric, bonding it with a special adhesive. He claims that 460 layers of basket-weave nylon bonded in this way, and then turned and polished, make the perfect wood.

Mr. Angell says that the main advantage of nylon over wood or composition is that it enables the weight to be distributed within the sphere to suit the individual player.

INDIA AND OURSELVES (continued from page 295)

industry. A polythene plant making use of this raw material was inevitable, and we are now putting up a substantial unit at Rishra.

In these new plants of ours in India the design and equipment are as up to date as any in the world. One of the striking contrasts of contemporary India is the sight of innumerable workers carrying loads in the traditional way while preparing for the arrival of the complicated equipment for a modern chemical works.

These developments require capital on a scale far beyond that of our modest Indian enterprises ten years ago, even though a proportion of the capital—between 20% and 50% in different projects—has been subscribed by nationals of the country. Equally they are bringing changes into the character of our Indian organisation.

Ten years ago I.C.I. (India) was mainly a merchanting company; today it has a large and increasing technical staff, and is rapidly assuming the familiar I.C.I. pattern of production, technical service, development and sales staff work-

ing together under the direction of the board, which is in head office, Calcutta, with supporting departments dealing with functional activities such as personnel and finance.

Another change in the Company is the increasing proportion of Indians in senior executive grades. Except for those who come from Britain with special knowledge and experience of I.C.I. to plan and start up the new plants, the majority of new recruits both for the technical and commercial staff are Indians from British and Indian universities. In years to come we may expect that in India, as elsewhere in the Commonwealth, our enterprises will be staffed substantially by the nationals of the country.

India's achievements in the first ten years of her independence, under a political system which remains fundamentally democratic, cannot fail to command respect. We all hope that her present difficulties will soon be overcome. Thereafter the opportunities in this vast country should be boundless, and we in I.C.I. expect to continue to take part in them.

NEWS IN PICTURES



New apprentice school. The Nobel Division apprentice training school and education centre at Ardeer was formally opened by Sir Ewart Smith (Deputy Chairman). The school is the eighth to be built by the Company since the war, and trade apprentices in I.C.I. now number some 2500. Above: In the hand tool bay Sir Ewart chats to apprentice fitter John McGuire. Also in the picture are Mr. L. Hall (Division joint managing director) and apprentice instructor Mr. A. H. Murray



Theatre reopened. On 20th July Sir Alexander Fleck opened the reconstructed theatre of the Synthonia Club, which was bombed in 1942. Above: The new-look Synthonia Club. Below: Sir Alexander about to unlock the main doors with a presentation silver gilt key carrying the Synthonia crest

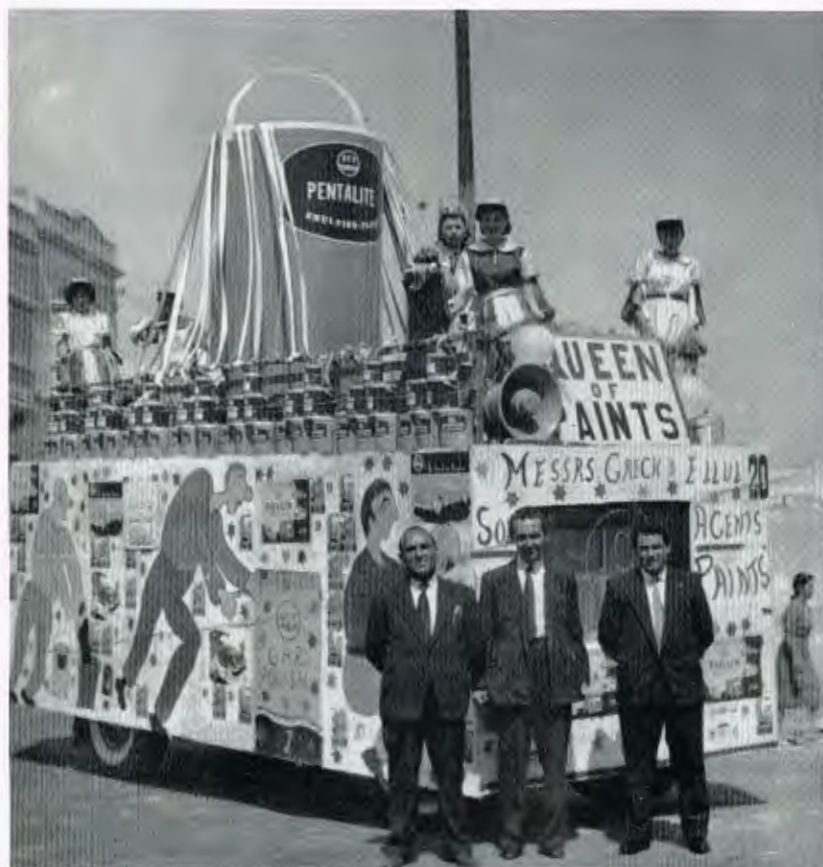


A boat called Maureen. A 35 ft. Yorkshire coble estimated to be worth £2000 was recently launched at Redcar. The boat, which took two years to build, is the work of Mr. Eric Corrie (Wilton Works) and his cousin



Crack shot. The Siller Gun shoot at Dumfries was won this year by Mr. Ian Beck (Nobel Division). The original Siller Gun Trophy was presented to the town by James I in 1617

PICTURES FROM OVERSEAS



Malta. The Queen of Paints float at this year's Maltese carnival was entered by Grech and Ellul, I.C.I.'s paint agents on the island. The young "Queen" is enthroned in front of a giant can of 'Pentalite'—the overseas version of 'Du-lite.' Foreground: Mr. E. Grech, Mr. F. Camilleri and Mr. A. E. Ellul



South Africa. An iron snake rears its head complete with safety hat and gas mask to the ropery music of Spalan of the Rigger Shop at A.E. & C.I.'s Modderfontein factory. The chain had failed in the standard load test and stretched, locking the links. Photographer was the Rigger Shop foreman Jock Webster



Holland. The enlarged Rotterdam headquarters of I.C.I. (Holland). Recent extensions (the dark section behind the lion) provide further office and warehouse accommodation for the Company's 130 employees. The original building was opened in 1952



Australia. Not a snow-clad mountain but the salt pile at I.C.I.A.N.Z. Botany Factory, and the skier is Australian stage and radio star Margo Lee. Miss Lee was at Botany with other members of the Australian production of the British winter-sports comedy "All for Mary" to take some "snow" shots for an Australian picture magazine



Japan. The Governor of Tokyo, Mr. Seiichi Yasui, presents a certificate of merit to Mr. J. S. Hollands (I.C.I. Japan) for the I.C.I. stand at the 1957 Japan International Trade Fair. The stand featured 'Terylene' and 'Procion' dyes



Tug-of-war at Tenbury. The summer camp at Tenbury for Metals Division's "under 18's" was also attended this year by boys from the Lightning Fastener factories at Rouen and Nürnberg. The tug-of-war picture was taken during the sports on Bank Holiday Saturday



Jamboree. Four-year-old Felicia Beaumont-Edmonds presents the Queen with a bouquet on her arrival at the Sutton Coldfield World Scout Jamboree. Her war-blinded father, Mr. C. F. Beaumont-Edmonds, who works in Metals Division Labour Department, is secretary to the Sutton Coldfield Boy Scouts Association. (Photo: Birmingham Mail)



American lawyers at Millbank. The Chairman and directors gave a reception for members of the American Bar Association Convention and the British legal profession. British guests included the Rt. Hon. Derek Walker-Smith, Lord Denning and Lord Cohen. Above: The Chairman welcoming some of the American guests



Official opening of TAS. Mr. W. J. Worboys (I.C.I. Commercial Director) formally opened the new I.C.I. teleprinter automatic switch system—the second to be installed in Britain—at Gloucester House, one of the zone centres of the I.C.I. network. Above: Mr. Worboys watching punched tape containing his inaugural message (right) being fed into the automatic transmitter



THIS MESSAGE IS TO INAUGURATE THE TELEPRINTER AUTOMATIC SWITCHING NETWORK, WHICH INCORPORATES ALL THE LATEST ADVANCES IN EQUIPMENT FOR IMPROVING THE SPEED AND EFFICIENCY OF THE TELEPRINTER SERVICE. I HOPE THAT ALL DIVISIONS AND REGIONS WILL ENCOURAGE THEIR STAFF TO MAKE FULL AND EFFECTIVE USE OF IT.

FROM: W. J. WORBOYS, COMMERCIAL DIRECTOR.
PICS NIL +---



50 years completed. Pilkington-Sullivan Works Manager, Mr. I. T. Pierce (right), hands a letter of congratulation from the Chairman to Mr. J. Davenport, a chargehand plumber

Unforgettable Year

By Ronald Farquharson



Gala day. *Winnington Park Recreation Club gala, attended by several thousand Alkali Division employees and their friends, included a circus, a fairground and sideshows, a fireworks display, three military bands and a floodlit tattoo*



First turf. *Mr. David Anderson (Alkali) holds a 'Perspex' case containing the first turf cut on the seven-acre site for Wilton's fourth polythene plant*



Model loco *made by an Alkali Division fitter, Mr. J. Moss of Winnington Works, took 4½ years to build in his spare time*



Gordon beats Pirie. *Mr. A. D. Gordon (Head Office) won an invitation 1500 metres race in 3 min. 53.4 sec. from Gordon Pirie on 17th July. Later in the month he took part in Ibbotson's record-breaking mile at the White City*



Butadiene for Italy. *Supplies of butadiene for Italy are now being exported from Wilton by rail tanker. Since the plant has no rail connection, the tanker goes part way by road on a specially adapted low loader vehicle*

THE year is 1921. A taxi fare began at 6d., the London buses had an open deck on the roof where hardy males sat exposed to the wind and the weather, and the women wore cloche hats and short skirts.

Just about at the end of that year, as a member of the Brunner-Mond "Foreign Legion," or foreign service trainee to use the official description, I was transferred from Winnington to the London Sales Office at 7* Cavendish Square. Entering the portals of a house that had not long before been a family residence, I presented myself to "Bertie" Houston—then Brunner-Mond's London sales manager—in the hope that he would allow me the opportunity of *actually earning my £3 a week.*

I was politely received. But there was an obvious lack either of briefing or recollection as to the capacity in which I had come. The problem and my presence were summarily disposed of by my being conducted from the rich décor of what had once been the *mise en scène* of Edwardian dinner parties, across the carpeted hall, through a green baize door, and thence down a bare passage which led towards the servants' hall, now referred to as the General Office.

I was left to introduce myself. I found that my immediate companions consisted of two order clerks of my own sex (far too preoccupied and conscientious in their duties ever to run the risk of initiating me into becoming of assistance to them) and five typists of the

opposite sex, to whom I could hardly offer aid, since my typing was confined to the "hunt and peck" method.

Thus it was that I found myself on that December day in 1921 with no work to do, no chair to sit on, and not even a spare peg on which to hang my hat and coat. Of paramount importance to me was the fact that I must, by some means or other, justify my continuing existence as a member of the "foreign legion" if I was to qualify for service abroad when I came of age in twelve months' time.

The immediate outlook took on an aspect which was gloomy and unpromising in the extreme.

Then the unexpected happened. The whole atmosphere of the servants' hall brightened through the entry of another trainee, a young man of my own age who introduced himself as Victor Wren. It was characteristic of him to hang up my hat and coat on the stand in the front hall usually reserved for those belonging to visiting directors, with a reassuring "Don't worry: no one's ever identified those as being mine!" He then disappeared and, successfully evading the attentions of the housekeeper, returned with a chair on which I might sit. ("Even if Roscoe Brunner is the chairman of the Company, he doesn't need two in his private bathroom upstairs!")

Thus provided for, we sat down on each side of an empty table in the centre of the General Office and decided to establish ourselves as "Office Boys Incorporated." No one, least of all ourselves, took us the

*It is interesting, in the light of the merger of four years later which gave birth to I.C.I., to note that the next-door house, No. 6 Cavendish Square, was at that time the London office of Nobel Industries Ltd.

least bit seriously. Indeed, we encountered some quite spirited opposition to our carrying out certain among our self-allotted tasks: one was that of replacing light bulbs, which the commissionaire considered none but himself capable of undertaking.

As time went on, we eventually took over all the filing from the typists. We collected all the soiled towels on Monday mornings and exchanged them for clean ones delivered at the door in a tricycle box propelled by a cockney youth called Ernie who gave us unrewarding tips for the 2.30 which we passed on as red-hot certainties to the commissionaire, thereby increasing his mistrust. We eventually earned his gratitude, however, by assisting him in putting up the mail and, notwithstanding frequent expressions of outrage, by relieving him of responsibility for the telephone exchange while the operator was at lunch.

Saturday morning was our busiest time. It was then that there descended on the office, to render written report on their activities of the week, the commercial travellers. With a disarming acceptance of their own literary shortcomings, it was often their habit to honour Victor and me with an invitation to transcribe their records into a slightly more acceptable form of prose. It was uphill work, calling for restraint, since we always had to bear in mind the embarrassment which would be caused were "Bertie" Houston to detect anything too obvious in the way of editing.

The most beloved Saturday morning character was Mr. Starkie: his specialised sphere was laundries, where I believe his knowledge and personality were an invaluable asset to Brunner-Mond. His sense of untiring duty must, I think, have been the cause of his bent frame, his hopelessly flat feet, and his general appearance of age and frailty. But he had a glorious sense of humour and laughed as heartily as the rest of us when, through some error on my part in arranging the office sweepstake for the Grand National, the name of Mr. Starkie was drawn from the hat containing the runners.

From the establishment of "Office Boys Incorporated" Victor Wren and I shared not only our self-appropriated chores but everything outside the office as well—our digs, our combined income plus the proceeds of anything we could pawn or borrow, his motor cycle, my gramophone, and even our girl friends.

It was odd that Victor should be a member of Brunner-Mond's "foreign legion," because his father, a former Regular Army officer, had turned to more

adventurous pursuits which included active service in the real Foreign Legion. As Major P. C. Wren he later won both fame and fortune through writing *Beau Geste* and *Beau Sabreur*.

Once every fortnight or so it was the habit of the sales manager, Guyton Butler, to descend on Cavendish Square; but the belief was that he no more than put his head round the managerial door and said "Good morning, laddie!" before disappearing upstairs to reclothe himself for more social occasions. Now and then orders were issued down the chain of command (reaching us through the commissionaire) that Victor and I attire ourselves suitably and report at a specified hour and rendezvous, when he treated us to an extravagant dinner and the most expensive seats at the theatre. Following this lavish hospitality we were dropped at our lodgings near Euston, while our generous host went on to board the sleeper for Crewe.

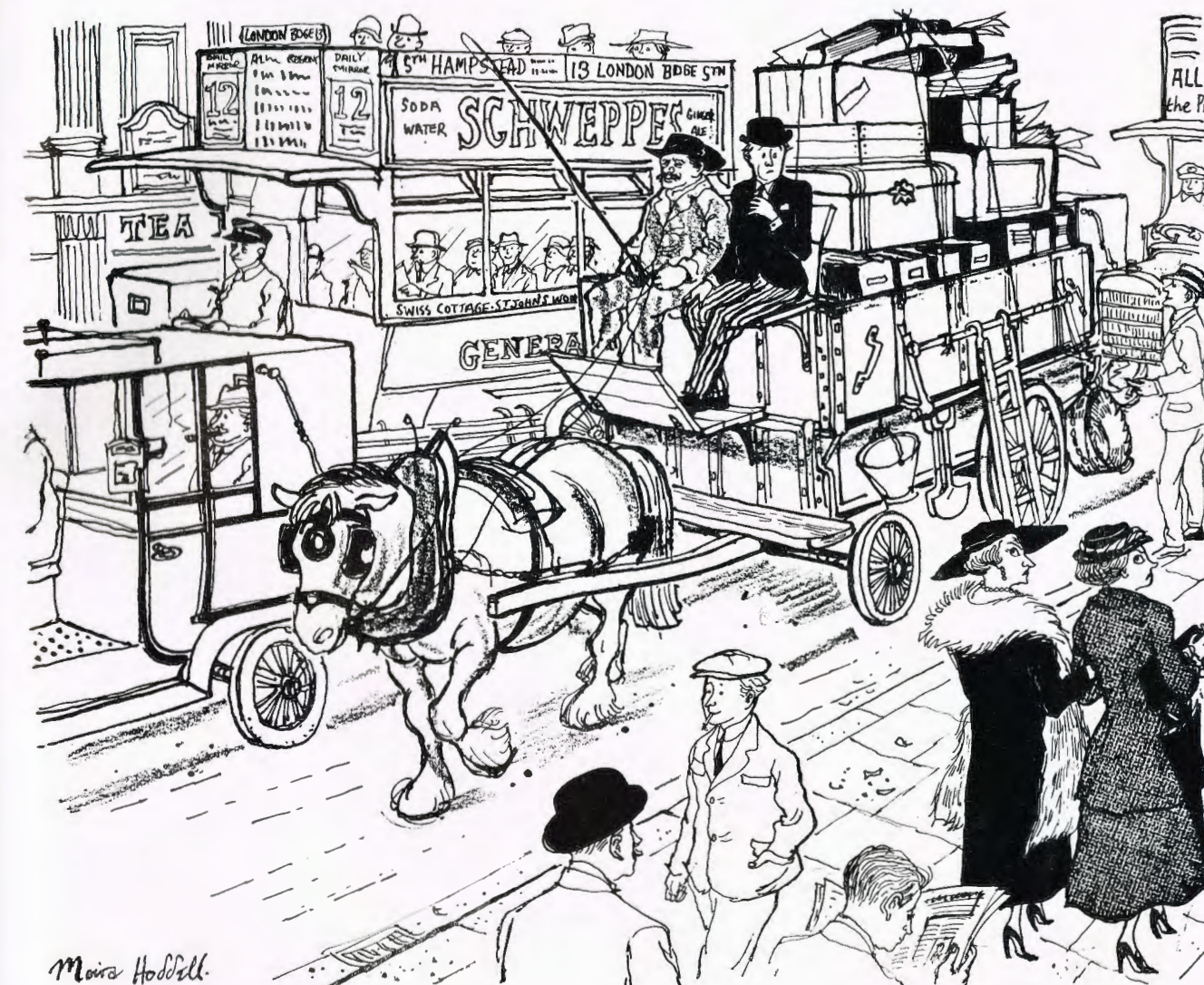
En route the taxi was invariably required to halt at 7 Cavendish Square, where Guyton Butler, immaculate in shining top hat and evening clothes, got out and disappeared upstairs. Fifteen minutes later the same figure, sartorially transformed, would rejoin us, now clad—as though for a rough Channel crossing—in a heavy tweed overcoat, a cloth cap and, folded neatly across his arm, a travelling rug. How clearly do I remember the unforgettable occasion when Guyton Butler, thus re-attired for travel, climbed back into the taxi only to find that the driver stubbornly refused to proceed any distance at all in the direction of Euston. He insisted that he was under orders to await the other passenger.

"What other passenger, laddie?" enquired Guyton Butler.

The reply was brief and logical enough. "I'm in the 'igh 'at!"

Only on three occasions did I see my London office manager during the twelve months after our brief first interview. One was when I craved leave of absence to play rugger for Rosslyn Park in a mid-week away match. I had to produce satisfactory evidence that it was the club's *first* fifteen which I had been invited to play for before permission was granted.

The next occasion was a less happy one for me. I was asked by "Bertie" Houston to share (for security purposes) the exposed heights above the horse's quarters with the driver of a refuse-collecting vehicle which had been chartered for the day to transport a virtual library of ancient office records from Cavendish



... it was inevitable that I should be recognised

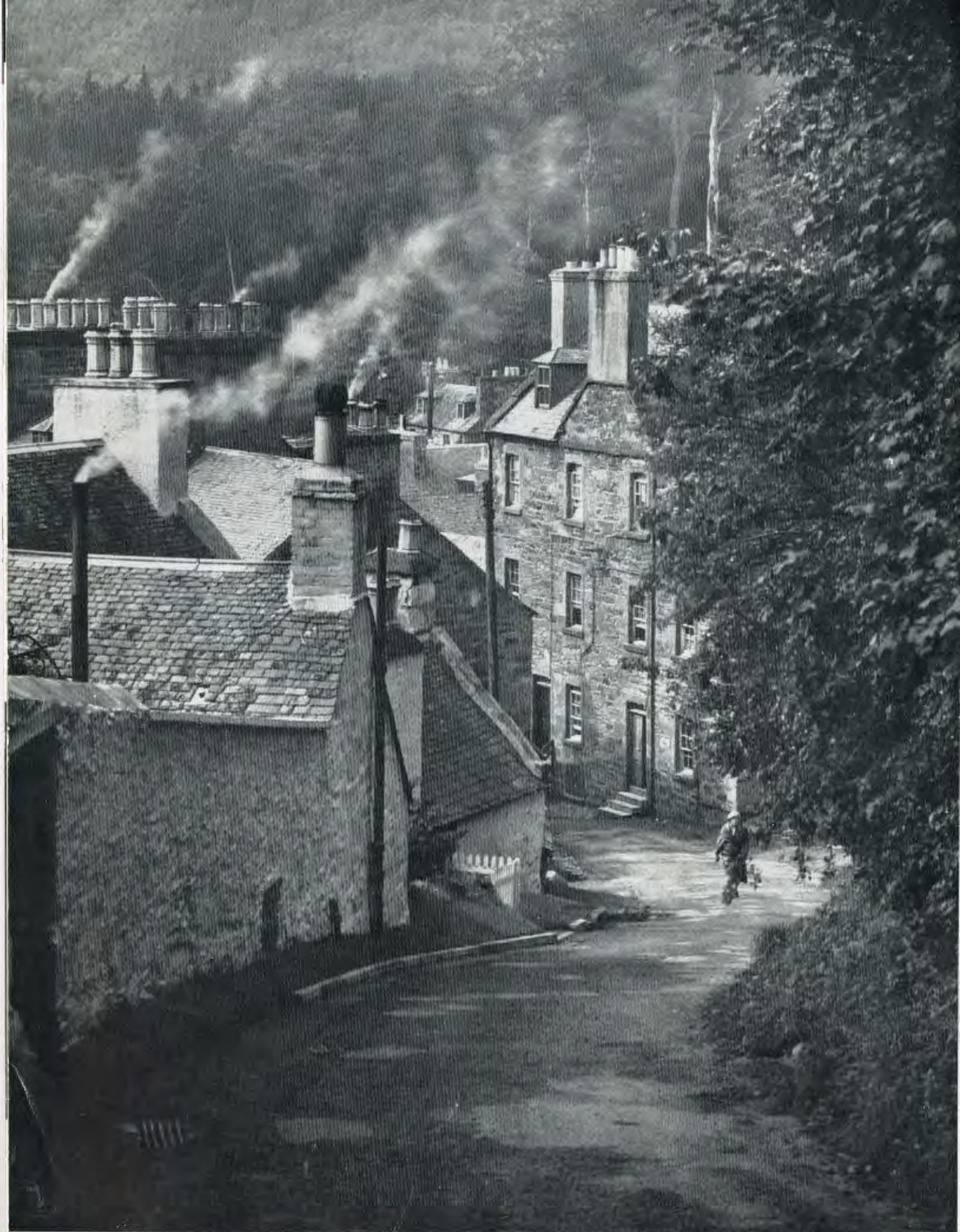
Square to the furnaces of our factory at Silvertown. It was inevitable that in the course of our passage along Oxford Street I should be recognised on at least three occasions by startled ladies of my acquaintance, whose immediate reactions were that, whereas I had led them to believe I was connected with the chemical industry, I was in reality employed by the Corporation.

My final interview took place in the awesome presence of both Sir John Nicholson, then sales director, and the chairman of Brunner, Mond & Co. (China) Ltd., the more than portly Percy Fowler. I was astonished to hear my manager deliver himself of a speech which was a masterpiece of flattering falsehood.

Main emphasis was laid on the facts that he had

taken a keen personal interest in my progress over the past year, with findings to the effect that my commercial talents, coupled with my ability and willingness to cope with difficult problems and overcome any degree of pressure, had proved me to be a young man of unbounded promise. He rounded off this speech with a few more equally mendacious flourishes; and I graduated on the spot from a doubtful candidate for service overseas to junior membership of Brunner, Mond & Co. (China) Ltd.

I do not know to this day whether these utterances were delivered out of sympathy with my known urge to go East or if they were just occasioned through a firm conviction that my presence had been cluttering up the place too long. Whichever way it was, it makes not the slightest difference to my gratitude.



"Autumn Morning in the Trossachs"

Photo by Miss I. L. Henderson (I.C. Insurance)